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ABSTRACT

This study examined the specific effects of picture and object stimuli on two types of language performance: comprehension and performance. Subjects were 48 4- and 5-year-olds who were randomly assigned to one of four groups. Groups were matched for SES, sex, and age and tested individually with one of the four measures: language comprehension with object stimuli; comprehension with picture stimuli; language production with object stimuli; or production with picture stimuli. Results indicated that: (1) 4- and 5-year-olds showed overall superior performance on object assessment tasks as compared to performance on picture-assessment tasks; (2) language comprehension tasks were performed more accurately than language production tasks by the 4- and 5-year-olds; and (3) an interaction effect occurred between task medium (picture or object) and response type (comprehension or production) so that comprehension and production differences were greater when assessed by pictures than by objects. (Author/SB)

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RESEARCH BULLETIN

A COMPARATIVE STUDY OF THE USE OF PICTURES AND OBJECTS IN ASSESSING CHILDREN'S RECEPTIVE AND PRODUCTIVE LANGUAGE

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Abstract

The problem of study dealt with two aspects of children's language knowledge and children's uses of pictures and objects when demonstrating their language skills. Forty-eight 4- and 5-year-olds were randomly assigned to one of four treatment groups, matched for SES, sex, and age. Subjects were individually tested with one of the four measures: language comprehension using object stimuli; comprehension with picture stimuli; language production using object stimuli; or production with picture stimuli. Main effects for stimulus medium and response mode were both significant, as well as the interaction. The discussion is oriented toward the developmental controversy around receptive and productive language skills and the impact of the representational medium upon performance in assessment tasks.

A Comparative Study of the Use of Pictures and Objects in Assessing Children's Receptive and Productive Language

Children's performances on sorting tasks have consistently corroborated Sigel's early finding that it is more difficult to categorize pictures of objects than it is to make classifications of the actual objects (Sigel & McBane, 1967). The effect is independent of the children's abilities to recognize or to name either the objects or the depicted objects. This relatively greater difficulty in dealing with pictorial materials has been shown to be particularly strong within American subculture populations (Gray & Klaus, 1965; Sigel, Anderson, & Shapiro, 1966; Wysocki & Wysocki, 1969). Cross-cultural replications have similarly supported the picture-object discrepancy (Deregowski & Serpell, 1971).

It might therefore be expected that such a discrepancy affects children's performances in assessment tasks. One kind of performance which has been assessed both by pictures and through the use of objects has been children's language development. Bellugi-Klima (1971), for example, reports a comprehension assessment technique utilizing objects, while Brown (1957) used pictures for tapping comprehension. Potts (1972) reports a technique for production assessment, employing pictures in a story-completion format. Berko (1958) also used pictures in her morpheme tests. Reynell (1969) uses both pictures and objects in her language assessment. However, in this latter instance, objects are used for the comprehension portion of the assessment, and pictures in the content

assessment of expressive language. It is in only the vocabulary section that objects and pictures are both employed.

No studies report the effects of a possible picture-object discrepancy in their comparisons of the subjects' performances on production and comprehension tasks. In a pilot study using picture stimuli for the production task and object stimuli for comprehension, Cocking found superior comprehension performance relative to the production performance for three- through five-year-olds. It is not clear, however, whether the effect, which held for each of the 44 linguistic structures examined, is attributable solely to the developmental feature of language or to the assessment materials.

The significance of this potential testing factor has direct bearing upon the theoretical controversy surrounding the precedence of either comprehension or production in the emergence of language in children. While some authors have claimed that comprehension of a structure emerges prior to the production of that structure (Cocking & Potts, 1976; Fraser, Bellugi, & Brown, 1963; Ingram, 1974; Lenneberg, 1962; Lovell & Dixon, 1967; McNeill, 1970; Menyuk, 1971; Nelson, 1973; Shipley, Smith, & Gleitman, 1969), others have maintainted that their data show the opposite to be true, with production emerging prior to comprehension (Chapman & Miller, Note 1).

In view of the evidence which seemed to imply easier task demands by object stimuli and by comprehension tasks, the present study was designed to look at the specific effects of picture and object stimuli on two types of language performance. Specifically, the hypotheses were:

HYPOTHESIS 1: Preschool children between 4 and 5 years of age will perform better on object tasks than on picture tasks.

HYPOTHESIS 2: Preschool children between 4 and 5 will perform better on a language comprehension task than on a language production task comprised of the same set of linguistic structures.

HYPOTHESIS 3: An interaction effect between task medium (picture or object) and response type (comprehension or production) is predicted, such that comprehension and production differences are greater when assessed by pictures than by objects. Second, the stimulus medium will not affect the easier of the two response types (comprehension), but production will be influenced, depending upon whether it is evaluated with object or pictorial stimuli.

Method

Subjects

Subjects were 48 white, four- and five-year-old, middle-class children from suburban communities, divided into four age groups of equal size, with each group evenly divided by sex. Groups were matched on the basis of age (within three months) and sex. The mean ages and age ranges for the four groups were: Group I: Mean age = 56.2 months, Range = 48-62 months; Group II: Mean age = 56.5 months, Range = 49-63 months; Group III: Mean age = 55.8 months, Range = 49-62 months; Group IV: Mean age = 56.1, Range = 50-65 months.

Materials

Four different tasks were administered, one to each group of children. The tasks varied across two dimensions: medium of the stimulus and type of response. Children were asked to respond to stories depicted by objects or pictures and the responses elicited were either verbal production responses or language comprehension responses. The tasks themselves assessed children's knowledge of 44 syntactic categories, tested across 100 items. Thus, the four tasks measured language comprehension using object stimuli, language production using object stimuli, comprehension with picture stimuli, and production with picture stimuli. The object stimuli, toys, included two male and two female dolls as the subjects of most of the stories, as well as various props (balls, animals, cars, sticks, blocks, and dishes) needed to illustrate certain actions. For the tasks in the picture mode, black and white line drawings were presented on 21 x 27 cm. cards. For the comprehension task, several picture choices were presented on a single card for each of the items. The pictures for the production task illustrated the subjects and occasionally the objects of the stories presented verbally by the experimenter.

Procedure

Each child was tested individually on one of the four tasks. The comprehension tasks were administered in one 25-minute session and the production tasks in two 25-minute sessions on subsequent days. In each task the experimenter explained the directions to the child, presented two or three example items and then began the task.

(a) Production/pictures: The first task was a picture-story completion game. Pictures were used to illustrate the stories to be completed with verbal responses from a child. The child was told, "This is a story game. I'm going to show you some pictures and tell you stories about them. Listen very carefully because I want you to help me finish each story." An example of one item (reversible passive) is: "I have a dog and a cat. They like to play and chase each other. Sometimes the dog chases the cat and sometimes the cat chases the dog. In this picture, the dog _____(is chased by the cat). And in this picture, the cat _____(is chased by the dog)."

(b) Production/objects: A second task involved the experimenter's acting out the same story as in the Production/picture task, but using dolls and various props for each item. The child's task was to complete the story verbally based on the actions of the dolls s/he observed.

(c) Comprehension/pictures: In this task the child was required to choose one picture from among several, the one corresponding to a verbal description presented by the experimenter. The child was told to, "Put your finger on the picture that shows what I am saying." For example: "Here are some pictures of boys and girls pushing. Show me 'The boy is pushed by the girl.'"

(d) Comprehension/objects: In this task the child was given toy actors and props. The child was told, "We're going to play some games. You don't have to talk at all. You just show me toys or give me toys or move toys." The experimenter verbally presented directions for the child to follow using the toys (e.g., "Show me: The boy is pushed by the girl").

Results

Each child was given a score based on the total percentage of correct responses. Ambiguous responses were scored correct if they followed the story context logically and demonstrated a knowledge of the syntactic structure being assessed. A series of t-tests indicated that the scores of children tested by different experimenters did not vary significantly. These t-tests also indicated that no sex differences existed within any of four subject groups and so the data within each group were collapsed across sex for further analyses.

To determine whether differences existed across the major variables tested, medium of stimulus and type of response, the data were analyzed in an analysis of variance. The analysis of variance, reported in Table 1, revealed significant main effects for stimulus medium ($F_{(1,44)} = 17.2$, $p < .01$) and response type ($F_{(1,44)} = 71.2$, $p < .01$). In addition there was a significant stimulus mode x response type interaction ($F_{(1,44)} = 41,1$, $p < .01$).

The means involved in the stimulus mode x response type interactions are presented in Figure 1. Pairwise comparisons of these means were carried out using Tukey's HSD test (Kirk, 1968). A significant difference was found between four of the six sets of means tested ($HSD_{(.05,\ 44df)} = 5.99$; $HSD_{(.01,44df)} = 7.43$). With respect to Picture-Object differences, children did significantly better on the picture-comprehension task than they did on the picture-production task; children did better on the object-production than they did on the picture-production task. With respect to the Comprehension-Production difference, children did better on comprehension

involving pictures than they did on the object-production task, and they performed better on object-comprehension than on the picture-production task.

Insert Table 1 and Figure 1 about here

Discussion

The results of this study support the first hypothesis: four- and five-year-old preschoolers show overall superior performance on object assessment tasks as compared to performance on picture-assessment tasks. We would like to suggest two reasons we think this occurs, the first dealing with children's understanding of pictorial representations and the second, with their acceptance of pictorial conventions. When a task depends directly upon the use of pictures and upon the interpretation of the pictures it is assumed that all children have comparable abilities for decoding pictures for the message which is necessary to participate in the assessment. Such an assumption is not valid, as demonstrated by individual differences in both picture decoding and picture comprehension abilities (Mackworth, Note 2).

Cazden (1972) has pointed out that correct interpretations of pictures may also depend upon "...acceptance of particular conventions" (p. 263, our underscoring). The acceptance of these conventions can influence the ways in which children respond to the task stimuli. Chittenden (Note 3) analyzed Peabody Picture Vocabulary Test (PPVT) stimuli and found that lower SES and middle SES children have different interpretations for some of the social conventions as represented in pictures. Rosenthal (cited in

Cazden, 1972, p. 264) also showed that the interpretations of these conventions can influence children's responses to pictures when she demonstrated that the shading convention of graphics was variously interpreted as light shadows or as dirt or a depiction of "dirty." Thus, children probably respond differentially to tasks which employ picture stimuli, depending upon whether the pictures are used for motivational purposes and have no direct bearing on the task (e.g., attention maintenance); or whether the pictorial representations are central to eliciting responses, as in the case of language tasks reported here.

The second hypothesis of this study was also supported by the research findings: language comprehension tasks were performed more accurately than language production tasks among the four- and five-year-olds. The present study did not analyze task performance (comprehension or production) for each linguistic structure because the number of structures (44) approached the number of subjects (48) studied. However, production and comprehension tasks were constructed so as to be parallel, a procedure not reported in other studies which compare production and comprehension. Thus, the procedure of the study was to compare task performances by using total scores for each task, but these total scores reflected the same linguistic categories, regardless of the specific task. This methodological point is important to keep in mind, since much of the controversy over the precedence of comprehension or production functions in the emergence of children's language hinges upon this distinction between general task performance or specific structure performance.

Ingram (1974) divides the sequence issue into three basic viewpoints. The three arguments are that: 1) all comprehension of language is complete before any production begins; 2) complete comprehension is attained prior to the production within a specific grammatical form or construction; and 3) some comprehension of a grammatical form always antedates the production of that form.

Data to support the first position, that all comprehension of language is complete before any production begins, come from unusual cases of dysfunction in which comprehension developed with virtually no corresponding productive ability (Brown, 1958; Lenneberg, 1962). There are no reports of the converse, where there has been extensive productive development without attendant comprehension. Lenneberg concluded that "It is... likely that the vocal production of language is dependent upon the understanding of language but not vice versa" (1962, p. 232).

The research area of semantic differentiation provides one way to evaluate the second position, that comprehension of a particular grammatical construction or form is complete before it is ever produced. The studies of early word learning and word extensions by children provide counter evidence to the notion that comprehension, even within grammatical forms, is complete before production of the form. Children first apply a word according to a very general feature (e.g., animate, inanimate) and then apply the word to every object which meets that feature.

The third argument is that some comprehension of specific grammatical forms or constructions occurs prior to production. Critics of this position expect uniform and predictable gaps between the comprehension and production

behaviors, but such data have not yet been reported. Ingram claims that there is no reason to expect the same developmental lag between comprehension and production for structure A as for structure B. It may be that comprehension and production are closer together in emergence than had been thought previously. The results of the present study, for example, show that the discrepancy between comprehension and production can be reduced by using materials more in line with the subjects' representational competencies. However, in spite of being able to narrow that gap, comprehension is always present to some extent when production capacities are in evidence. The assertion of this third viewpoint, then, is supported by the results of our study.

The interactions which were predicted in this study (hypothesis #3) were confirmed. When pictures were used, children did significantly better on the comprehension task than on the production task, but this difference did not appear when objects were used. When assessing comprehension performance, it did not make a significant difference whether pictures or objects were used, but on the production task it did. The two pairs of means which did not reach significance indicated that comprehension performance is not different among groups using two kinds of materials, and that when objects are used significant differences between receptive and productive language functions do not eventuate.

These results are in accord with developmental aspects of each main effect. Sigel (1970) has stated that representational competence proceeds from knowledge of directly observable objects and events toward understanding, anticipations, and reconstructions based on inferences, where the

term "representation" is used to designate "...the relation between an abstract concept and a concrete example" (Werner & Kaplan, 1963, p. 15). A perceptual-cognitive interaction is involved in the transition between information gained from three-dimensional space to two-dimensional graphic representations because of the reduction in informational cues. The results reported here demonstrate that when a task demand of comprehension or production is combined with the additional demand to make inferences based on the stimuli, the more difficult of the two language functions is seriously affected while the developmentally easier of the two remains unaffected.

Our concern in this paper has been to show that objects and pictures cannot be regarded as equivalents as stimuli for assessment tasks. Second, the two language behaviors of comprehension and production were shown to be affected differentially by the two stimulus media. Our discussion with regard to this second point focused upon the current theoretical controversy of how these two language functions fit into a developmental sequence. The data support the position that comprehension is present whenever production behaviors are expressed. It would seem advisable to continue investigations of comprehension and production differences which focus upon comparisons within specific linguistic structures. The influence of materials of differing representational levels upon assessment task performances should be extended as well.

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Table 1

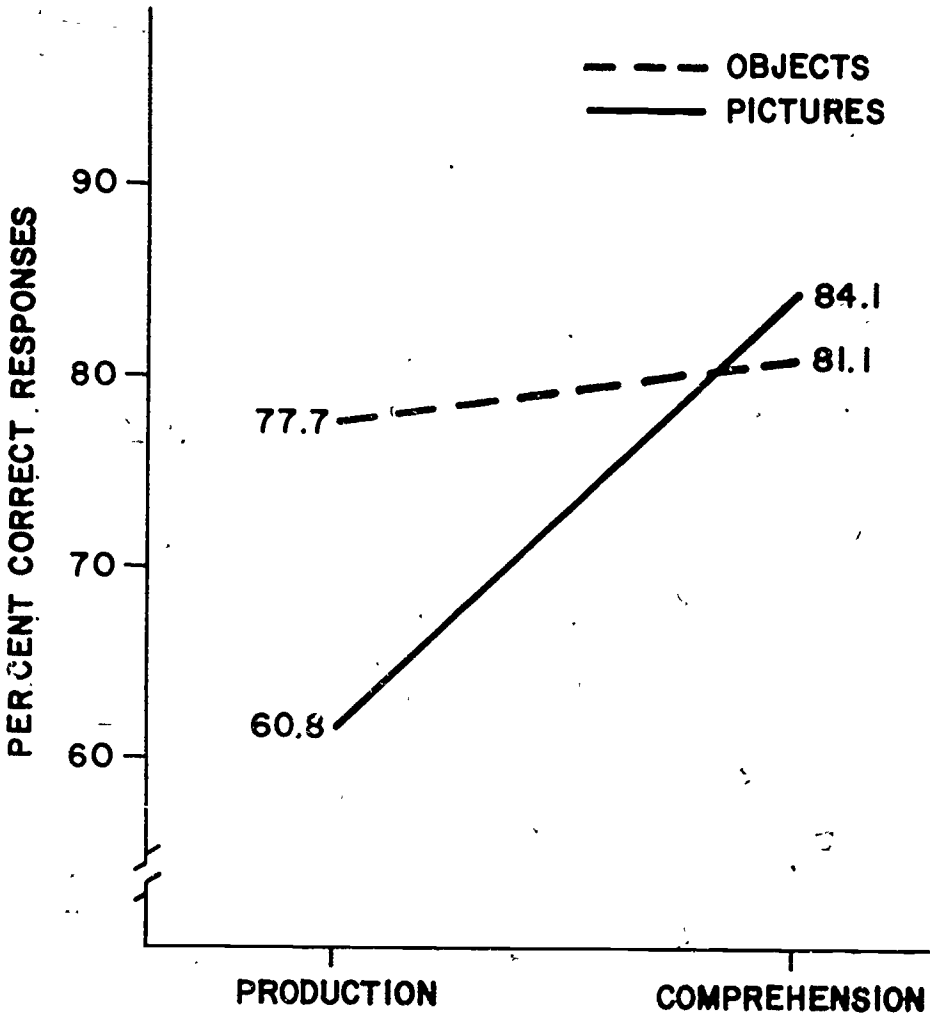
Analysis of Variance for Two Levels of Stimulus Modes and Two Levels of Response Types

Source	SS	df	MS	F	p
A Stimulus Mode	515.6	1	515.6	17.2	<.01
B Response Type	2134.7	1	2134.7	71.2	<.01
AB Interaction	1233	1	1233	41.1	<.01
within	1320	44	30		
Total	5203.3	47			

$F_{(1,44)} = 7.26$

Figure Caption

Figure 1. Response means on two types of language tasks tested in two stimulus modes.



$HSD_{(.05,44df)} = 5.99$

$HSD_{(.01,44df)} = 7.43$